1652

M. Rao

RAW SEQUENCE LISTING
PATENT APPLICATION: US/09/262,126C

DATE: 04/18/2001
TIME: 11:17:36

Input Set : A:\GC396-2-seqlist.txt
Output Set: N:\CRF3\04182001\I262126C.raw


```
  3 <110> APPLICANT: Miller, Brian S.
  4       Shetty, Jayarama K.
  6 <120> TITLE OF INVENTION: Modified Forms of Pullulanase
  9 <130> FILE REFERENCE: GC396-2
 11 <140> CURRENT APPLICATION NUMBER: 09/262,126C
 12 <141> CURRENT FILING DATE: 1999-03-03
 14 <160> NUMBER OF SEQ ID NOS: 9
 16 <170> SOFTWARE: FastSEQ for Windows Version 3.0
 18 <210> SEQ ID NO: 1
 19 <211> LENGTH: 2794
 20 <212> TYPE: DNA
 21 <213> ORGANISM: Bacillus deramificans
 23 <220> FEATURE:
 24 <221> NAME/KEY: misc_feature
 25 <222> LOCATION: (1)...(2794)
 26 <223> OTHER INFORMATION: n = A, T, C, or G
 28 <400> SEQUENCE: 1
 29  gatgggaaca cgacaacgat cattgtccac tatttttgcc ctgctggtga ttatcaacct     60
 30  tggagtctat ggatgtggcc aaaagacgga ggtggggctg aatacgattt caatcaaccg    120
 31  gctgactctt ttggagctgt tgcaagtgct gatattccag gaaacccaag tcaggtagga    180
 32  attatcgttc gcactcaaga ttggaccaaa gatgtgagcg ctgaccgcta catagattta    240
 33  agcaaaggaa atgaggtgtg gcttgtagaa ggaaacagcc aaatttttta taatgaaaaa    300
 34  gatgctgagg atgcagctaa acccgctgta agcaacgctt atttagatgc ttcaaaccag    360
 35  gtgctggtta aacttagcca gccgttaact cttggggaag gnnnaagcgg ctttacggtt    420
 36  catgacgaca cagcaaataa ggatattcca gtgacatctg tgaaggatgc aagtcttggt    480
 37  caagatgtaa ccgctgtttt ggcaggtacc ttccaacata tttttggagg ttccgattgg    540
 38  gcacctgata atcacagtac tttattaaaa aaggtgacta acaatctcta tcaattctca    600
 39  ggagatcttc ctgaaggaaa ctaccaatat aaagtggctt taaatgatag ctggaataat    660
 40  ccgagttacc catctgacaa cattaattta acagtccctg ccggcggtgc acacgtcact    720
 41  ttttcgtata ttccgtccac tcatgcagtc tatgacacaa ttaataatcc taatgcggat    780
 42  ttacaagtag aaagcggggt taaaacggat ctcgtgacgg ttactctagg ggaagatcca    840
 43  gatgtgagcc atactctgtc cattcaaaca gatggctatc aggcaaagca ggtgatacct    900
 44  cgtaatgtgc ttaattcatc acagtactac tattcaggag atgatcttgg gaatacctat    960
 45  acacagaaag caacaacctt taaagtctgg gcaccaactt ctactcaagt aaatgttctt   1020
 46  ctttatgaca gtgcaacggg ttctgtaaca aaaatcgtac ctatgacggc atcgggccat   1080
 47  ggtgtgtggg aagcaacggt taatcaaaac cttgaaaatt ggtattacat gtatgaggta   1140
 48  acaggccaag gctctacccg aacggctgtt gatccttatg caactgcgat tgcaccaaat   1200
 49  ggaacgagag gcatgattgt ggacctggct aaaacagatc ctgctggctg gaacagtgat   1260
 50  aaacatatta cgccaaagaa tatagaagat gaggtcatct atgaaatgga tgtccgtgac   1320
 51  ttttccattg accctaattc gggtatgaaa aataaaggga agtatttggc tcttacagaa   1380
 52  aaaggaacaa agggccctga caacgtaaag acggggatag attccttaaa acaacttggg   1440
 53  attactcatg ttcagcttat gcctgttttc gcatctaaca gtgtcgatga aactgatcca   1500
 54  acccaagata attggggtta tgaccctcgc aactatgatg ttcctgaagg gcagtatgct   1560
 55  acaaatgcga atggtaatgc tcgtataaaa gagtttaagg aaatggttct ttcactccat   1620
 56  cgtgaacaca ttggggttaa catggatgtt gtctataatc ataccttgc cacgcaaatc   1680
 57  tctgacttcg ataaaattgt accagaatat tattaccgta cgatgatcca ggtaattata   1740
 58  ccaacggatc aggtactgga aatgaaattg cangcngaaa ggccaatggt tcaaaaattt   1800
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PATENT APPLICATION: US/09/262,126C TIME: 11:17:36

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Output Set: N:\CRF3\04182001\I262126C.raw

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     59  attattgatt cccttaagta ttgggtcaat gagtatcata ttgacggctt ccgttttgac    1860
     60  ttaatggcgc tgcttggaaa agacacgatg tccaaagctg cctcggagct tcatgctatt    1920
     61  aatccaggaa ttgcacttta cggtgagcca tggacgggtg gaacctctgc actgccagat    1980
     62  gatcagcttc tgacaaaagg agctcaaaaa ggcatgggag tagcggtgtt taatgacaat    2040
     63  ttacgaaacg cgttggacgg caatgtcttt gattcttccg ctcaaggttt tgcgacaggt    2100
     64  gcaacaggct taactgatgc aattaagaat ggcgttgagg ggagtattaa tgactttacc    2160
     65  tcttcaccag gtgagacaat taactatgtc acaagtcatg ataactacac cctttgggac    2220
     66  aaaatagccc taagcaatcc taatgattcc gaagcggatc ggattaaaat ggatgaactc    2280
     67  gcacaagcag ttgttatgac ctcacaaggc gttccattca tgcaaggcgg ggaagaaatg    2340
W--> 68  cttcgtanaa aaggcggcaa cgacaatagt tataatgcag gcgatgcggt caatgagttt    2400
     69  gattggagca ggaaagctca atatccagat gttttcaact attatagcgg gctaatccac    2460
     70  cttcgtcttg atcacccagc cttccgcatg acgacagcta atgaaatcaa tagccacctc    2520
     71  caattcctaa atagtccaga gaacacagtg gcctatgaat taactgatca tgttaataaa    2580
     72  gacaaatggg gaaatatcat tgttgtttat aacccaaata aaactgtagc aaccatcaat    2640
     73  ttgccgagcg ggaaatgggc aatcaatgct acgagcggta aggtaggaga atccaccctt    2700
     74  ggtcaagcag agggaagtgt ccaagtacca ggtatatcta tgatgatcct tcatcaagag    2760
     75  gtaagcccag accacggtaa aaagtaatag aaaa                                2794
     77 <210> SEQ ID NO: 2
     78 <211> LENGTH: 956
     79 <212> TYPE: PRT
     80 <213> ORGANISM: Bacillus deramificans
     82 <220> FEATURE:
     83 <221> NAME/KEY: VARIANT
     84 <222> LOCATION: (1)...(956)
     85 <223> OTHER INFORMATION: Xaa = Any Amino Acid
     87 <400> SEQUENCE: 2
     88  Met Ala Lys Lys Leu Ile Tyr Val Cys Leu Ser Val Cys Leu Val Leu
     89   1               5                  10                  15
     90  Thr Trp Ala Phe Asn Val Lys Gly Gln Ser Ala His Ala Asp Gly Asn
     91              20                  25                  30
     92  Thr Thr Thr Ile Ile Val His Tyr Phe Cys Pro Ala Gly Asp Tyr Gln
     93          35                  40                  45
     94  Pro Trp Ser Leu Trp Met Trp Pro Lys Asp Gly Gly Gly Ala Glu Tyr
     95      50                  55                  60
     96  Asp Phe Asn Gln Pro Ala Asp Ser Phe Gly Ala Val Ala Ser Ala Asp
     97  65                  70                  75                  80
     98  Ile Pro Gly Asn Pro Ser Gln Val Gly Ile Ile Val Arg Thr Gln Asp
     99                  85                  90                  95
    100  Trp Thr Lys Asp Val Ser Ala Asp Arg Tyr Ile Asp Leu Ser Lys Gly
    101              100                 105                 110
    102  Asn Glu Val Trp Leu Val Glu Gly Asn Ser Gln Ile Phe Tyr Asn Glu
    103          115                 120                 125
    104  Lys Asp Ala Glu Asp Ala Ala Lys Pro Ala Val Ser Asn Ala Tyr Leu
    105      130                 135                 140
    106  Asp Ala Ser Asn Gln Val Leu Val Lys Leu Ser Gln Pro Leu Thr Leu
    107  145                 150                 155                 160
W--> 108  Gly Glu Gly Xaa Ser Gly Phe Thr Val His Asp Asp Thr Ala Asn Lys
    109                 165                 170                 175
    110  Asp Ile Pro Val Thr Ser Val Lys Asp Ala Ser Leu Gly Gln Asp Val
```

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PATENT APPLICATION: US/09/262,126C TIME: 11:17:36

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Output Set: N:\CRF3\04182001\I262126C.raw

```
111              180                 185                 190
112  Thr Ala Val Leu Ala Gly Thr Phe Gln His Ile Phe Gly Gly Ser Asp
113          195                 200                 205
114  Trp Ala Pro Asp Asn His Ser Thr Leu Leu Lys Lys Val Thr Asn Asn
115      210                 215                 220
116  Leu Tyr Gln Phe Ser Gly Asp Leu Pro Glu Gly Asn Tyr Gln Tyr Lys
117  225                 230                 235                 240
118  Val Ala Leu Asn Asp Ser Trp Asn Asn Ser Tyr Pro Ser Asp Asn Ile
119                  245                 250                 255
120  Asn Leu Thr Val Pro Ala Gly Gly Ala His Val Thr Phe Ser Tyr Ile
121              260                 265                 270
122  Pro Ser Thr His Ala Val Tyr Asp Thr Ile Asn Asn Pro Asn Ala Asp
123          275                 280                 285
124  Leu Gln Val Glu Ser Gly Val Lys Thr Asp Leu Val Thr Val Thr Leu
125      290                 295                 300
126  Gly Glu Asp Pro Asp Val Ser His Thr Leu Ser Ile Gln Thr Asp Gly
127  305                 310                 315                 320
128  Tyr Gln Ala Lys Gln Val Ile Pro Arg Asn Val Leu Asn Ser Ser Gln
129                  325                 330                 335
130  Tyr Tyr Tyr Ser Gly Asp Asp Leu Gly Asn Thr Tyr Thr Gln Lys Ala
131              340                 345                 350
132  Thr Thr Phe Lys Val Trp Ala Pro Thr Ser Thr Gln Val Asn Val Leu
133          355                 360                 365
134  Leu Tyr Asp Ser Ala Thr Gly Ser Val Thr Lys Ile Val Pro Met Thr
135      370                 375                 380
136  Ala Ser Gly His Gly Val Trp Glu Ala Thr Val Asn Gln Asn Leu Glu
137  385                 390                 395                 400
138  Asn Trp Tyr Tyr Met Tyr Glu Val Thr Gly Gln Gly Ser Thr Arg Thr
139                  405                 410                 415
140  Ala Val Asp Pro Tyr Ala Thr Ala Ile Ala Pro Asn Gly Thr Arg Gly
141              420                 425                 430
142  Met Ile Val Asp Leu Ala Lys Thr Asp Pro Ala Gly Trp Asn Ser Asp
143          435                 440                 445
144  Lys His Ile Thr Pro Lys Asn Ile Glu Asp Glu Val Ile Tyr Glu Met
145      450                 455                 460
146  Asp Val Arg Asp Phe Ser Ile Asp Pro Asn Ser Gly Met Lys Asn Lys
147  465                 470                 475                 480
148  Gly Lys Tyr Leu Ala Leu Thr Glu Lys Gly Thr Lys Gly Pro Asp Asn
149                  485                 490                 495
150  Val Lys Thr Gly Ile Asp Ser Leu Lys Gln Leu Gly Ile Thr His Val
151              500                 505                 510
152  Gln Leu Met Pro Val Phe Ala Ser Asn Ser Val Asp Glu Thr Asp Pro
153          515                 520                 525
154  Thr Gln Asp Asn Trp Gly Tyr Asp Pro Arg Asn Tyr Asp Val Pro Glu
155      530                 535                 540
156  Gly Gln Tyr Ala Thr Asn Ala Asn Gly Asn Ala Arg Ile Lys Glu Phe
157  545                 550                 555                 560
158  Lys Glu Met Val Leu Ser Leu His Arg Glu His Ile Gly Val Asn Met
159                  565                 570                 575
```

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PATENT APPLICATION: US/09/262,126C TIME: 11:17:36

Input Set : A:\GC396-2-seqlist.txt
Output Set: N:\CRF3\04182001\I262126C.raw

```
     160  Asp Val Val Tyr Asn His Thr Phe Ala Thr Gln Ile Ser Asp Phe Asp
     161              580                 585                 590
     162  Lys Ile Val Pro Glu Tyr Tyr Tyr Arg Thr Met Ile Gln Val Ile Ile
     163          595                 600                 605
W--> 164  Pro Thr Asp Gln Val Leu Glu Met Lys Leu Xaa Ala Glu Arg Pro Met
     165      610                 615                 620
     166  Val Gln Lys Phe Ile Ile Asp Ser Leu Lys Tyr Trp Val Asn Glu Tyr
     167  625                 630                 635                 640
     168  His Ile Asp Gly Phe Arg Phe Asp Leu Met Ala Leu Leu Gly Lys Asp
     169                  645                 650                 655
     170  Thr Met Ser Lys Ala Ala Ser Glu Leu His Ala Ile Asn Pro Gly Ile
     171              660                 665                 670
     172  Ala Leu Tyr Gly Glu Pro Trp Thr Gly Gly Thr Ser Ala Leu Pro Asp
     173          675                 680                 685
     174  Asp Gln Leu Leu Thr Lys Gly Ala Gln Lys Gly Met Gly Val Ala Val
     175      690                 695                 700
     176  Phe Asn Asp Asn Leu Arg Asn Ala Leu Asp Gly Asn Val Phe Asp Ser
     177  705                 710                 715                 720
     178  Ser Ala Gln Gly Phe Ala Thr Gly Ala Thr Gly Leu Thr Asp Ala Ile
     179                  725                 730                 735
     180  Lys Asn Gly Val Glu Gly Ser Ile Asn Asp Phe Thr Ser Ser Pro Gly
     181              740                 745                 750
     182  Glu Thr Ile Asn Tyr Val Thr Ser His Asp Asn Tyr Thr Leu Trp Asp
     183          755                 760                 765
     184  Lys Ile Ala Leu Ser Asn Pro Asn Asp Ser Glu Ala Asp Arg Ile Lys
     185      770                 775                 780
     186  Met Asp Glu Leu Ala Gln Ala Val Val Met Thr Ser Gln Gly Val Pro
     187  785                 790                 795                 800
W--> 188  Phe Met Gln Gly Gly Glu Glu Met Leu Arg Xaa Lys Gly Gly Asn Asp
     189                  805                 810                 815
     190  Asn Ser Tyr Asn Ala Gly Asp Ala Val Asn Glu Phe Asp Trp Ser Arg
     191              820                 825                 830
     192  Lys Ala Gln Tyr Pro Asp Val Phe Asn Tyr Tyr Ser Gly Leu Ile His
     193          835                 840                 845
     194  Leu Arg Leu Asp His Pro Ala Phe Arg Met Thr Thr Ala Asn Glu Ile
     195      850                 855                 860
     196  Asn Ser His Leu Gln Phe Leu Asn Ser Pro Glu Asn Thr Val Ala Tyr
     197  865                 870                 875                 880
     198  Glu Leu Thr Asp His Val Asn Lys Asp Lys Trp Gly Asn Ile Ile Val
     199                  885                 890                 895
     200  Val Tyr Asn Pro Asn Lys Thr Val Ala Thr Ile Asn Leu Pro Ser Gly
     201              900                 905                 910
     202  Lys Trp Ala Ile Asn Ala Thr Ser Gly Lys Val Gly Glu Ser Thr Leu
     203          915                 920                 925
     204  Gly Gln Ala Glu Gly Ser Val Gln Val Pro Gly Ile Ser Met Met Ile
     205      930                 935                 940
     206  Leu His Gln Glu Val Ser Pro Asp His Gly Lys Lys
     207  945                 950                 955
     209 <210> SEQ ID NO: 3
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RAW SEQUENCE LISTING DATE: 04/18/2001
PATENT APPLICATION: US/09/262,126C TIME: 11:17:36

Input Set : A:\GC396-2-seqlist.txt
Output Set: N:\CRF3\04182001\I262126C.raw

<211> LENGTH: 718
<212> TYPE: PRT
<213> ORGANISM: Bacillus subtilis
<400> SEQUENCE: 3

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 1               5                  10                  15
Ile Ile Thr Val Leu Ile Pro Ala Glu Gln Lys Glu Ile Met Thr Pro
            20                  25                  30
Pro Phe Arg Leu Glu Thr Glu Ile Thr Asp Phe Pro Leu Ala Val Arg
        35                  40                  45
Glu Glu Tyr Ser Leu Glu Ala Lys Tyr Lys Tyr Val Cys Val Ser Asp
    50                  55                  60
His Pro Val Thr Phe Gly Lys Ile His Cys Val Arg Ala Ser Ser Gly
65                  70                  75                  80
His Lys Thr Asp Leu Gln Ile Gly Ala Val Ile Arg Thr Ala Ala Phe
                85                  90                  95
Asp Asp Glu Phe Tyr Tyr Asp Gly Glu Leu Gly Ala Val Tyr Thr Ala
            100                 105                 110
Asp His Thr Val Phe Lys Val Trp Ala Pro Ala Ala Thr Ser Ala Ala
        115                 120                 125
Val Lys Leu Ser His Pro Asn Lys Ser Gly Arg Thr Phe Gln Met Thr
    130                 135                 140
Arg Leu Glu Lys Gly Val Tyr Ala Val Thr Val Thr Gly Asp Leu His
145                 150                 155                 160
Gly Tyr Glu Tyr Leu Phe Cys Ile Cys Asn Asn Ser Glu Trp Met Glu
                165                 170                 175
Thr Val Asp Gln Tyr Ala Lys Ala Val Thr Val Asn Gly Glu Lys Gly
            180                 185                 190
Val Val Leu Arg Pro Asp Gln Met Lys Trp Thr Ala Pro Leu Lys Pro
        195                 200                 205
Phe Ser His Pro Val Asp Ala Val Ile Tyr Glu Thr His Leu Arg Asp
    210                 215                 220
Phe Ser Ile His Glu Asn Ser Gly Met Ile Asn Lys Gly Lys Tyr Leu
225                 230                 235                 240
Ala Leu Thr Glu Thr Asp Thr Gln Thr Ala Asn Gly Ser Ser Ser Gly
                245                 250                 255
Leu Ala Tyr Val Lys Glu Leu Gly Val Thr His Val Glu Leu Leu Pro
            260                 265                 270
Val Asn Asp Phe Ala Gly Val Asp Glu Glu Lys Pro Leu Asp Ala Tyr
        275                 280                 285
Asn Trp Gly Tyr Asn Pro Leu His Phe Phe Ala Pro Glu Gly Ser Tyr
    290                 295                 300
Ala Ser Asn Pro His Asp Pro Gln Thr Arg Lys Thr Glu Leu Lys Gln
305                 310                 315                 320
Met Ile Asn Thr Leu His Gln His Gly Leu Arg Val Ile Leu Asp Val
                325                 330                 335
Val Phe Asn His Val Tyr Lys Arg Glu Asn Ser Pro Phe Glu Lys Thr
            340                 345                 350
Val Pro Gly Tyr Phe Phe Arg His Asp Glu Cys Gly Met Pro Ser Asn
```

VERIFICATION SUMMARY DATE: 04/18/2001
PATENT APPLICATION: **US/09/262,126C** TIME: 11:17:37

Input Set : **A:\GC396-2-seqlist.txt**
Output Set: **N:\CRF3\04182001\I262126C.raw**

L:35 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1
L:58 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1
L:68 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1
L:108 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:2
L:164 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:2
L:188 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:2

STATISTICS SUMMARY DATE: 04/18/2001
PATENT APPLICATION: **US/09/262,126C** TIME: 11:17:37

Input Set : **A:\GC396-2-seqlist.txt**
Output Set: **N:\CRF3\04182001\I262126C.raw**

Application Serial Number: US/09/262,126C
Alpha or Numeric: Numeric
Application Class:
Application File Date: 03-03-1999
Art Unit: 1652
Software Application: FastSeq
Total Number of Sequences: 9
Total Nucleotides: 2794
Total Amino Acids: 2795
Number of Errors: 0
Number of Warnings: 6
Number of Corrections: 0

MESSAGE SUMMARY

341 W: 6 ((46) "n" or "Xaa" used)